

WELCOME TO LET'S TALK ABOUT HANFORD

WE WILL BEGIN TONIGHT'S
CONVERSATION SOON





Let's talk about Hanford

FEBRUARY 24, 2022

HANFORD GEOLOGY FLOODS, LAVA, AND MORE

A conversation with you

Featuring
Bruce Bjornstad
Geologist, retired



Hanford Site Geology



Bruce Bjornstad

PNNL Geologist/Hydrogeologist (Retired)

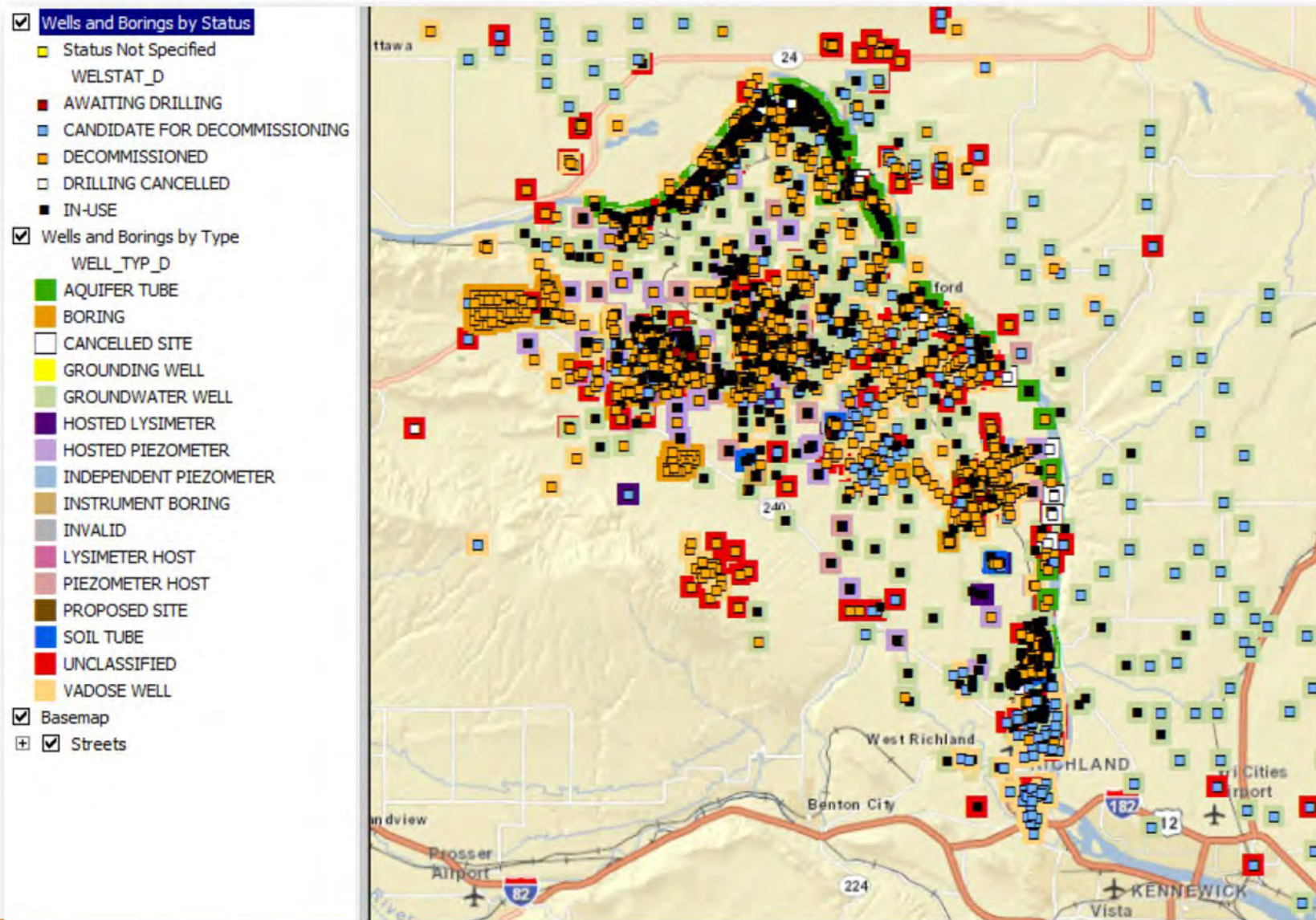
Hanford Site Stratigraphy

GEOLOGIC UNIT	SOURCE	AGE (yrs before present)
	Windblown deposits	0-14k
Hanford formation *	Ice Age Flood deposits	14-20k
<hr/> <i>BREAK (erosion or nondeposition)</i> <hr/>		
Ringold Formation	Ancient river and lake deposits	3-10 million
Columbia River basalt	Lava flows	10-17 million

* most contaminated

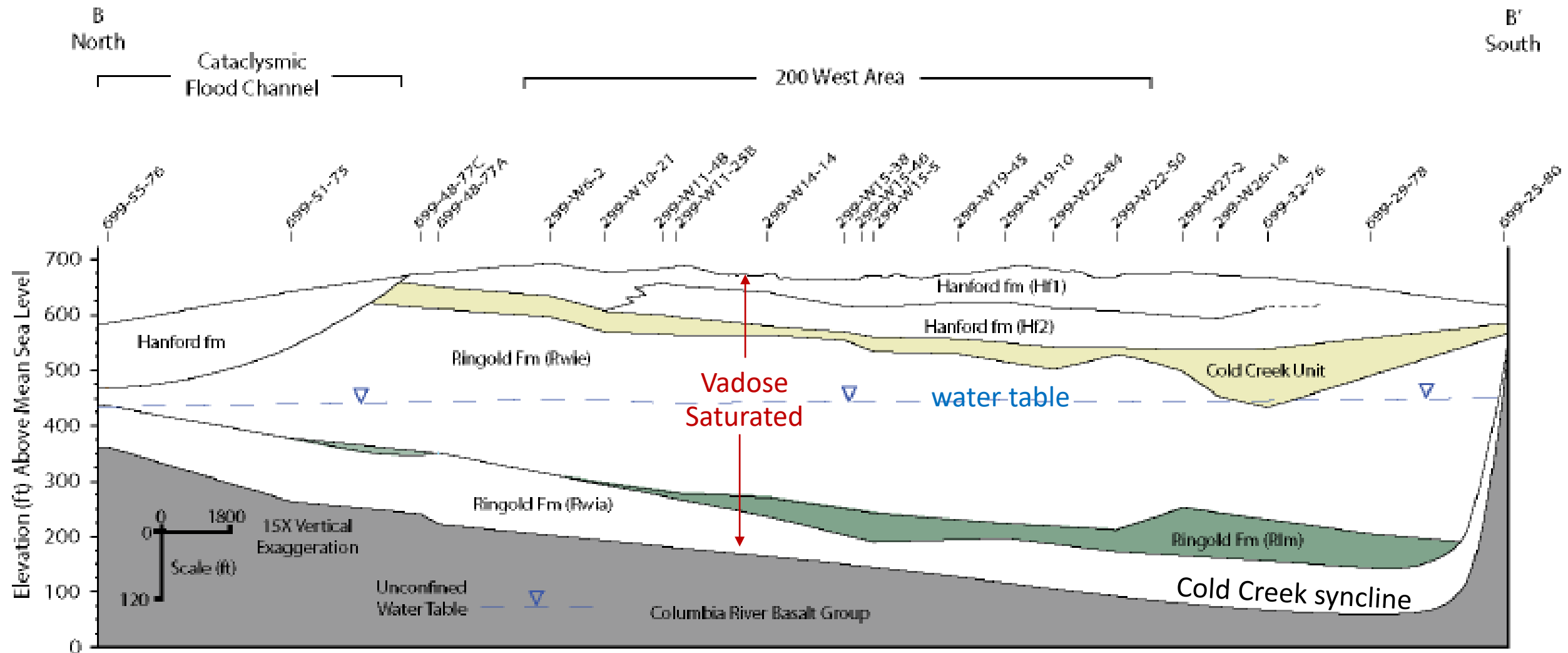


Wells and Borings Within or Near the Hanford Site

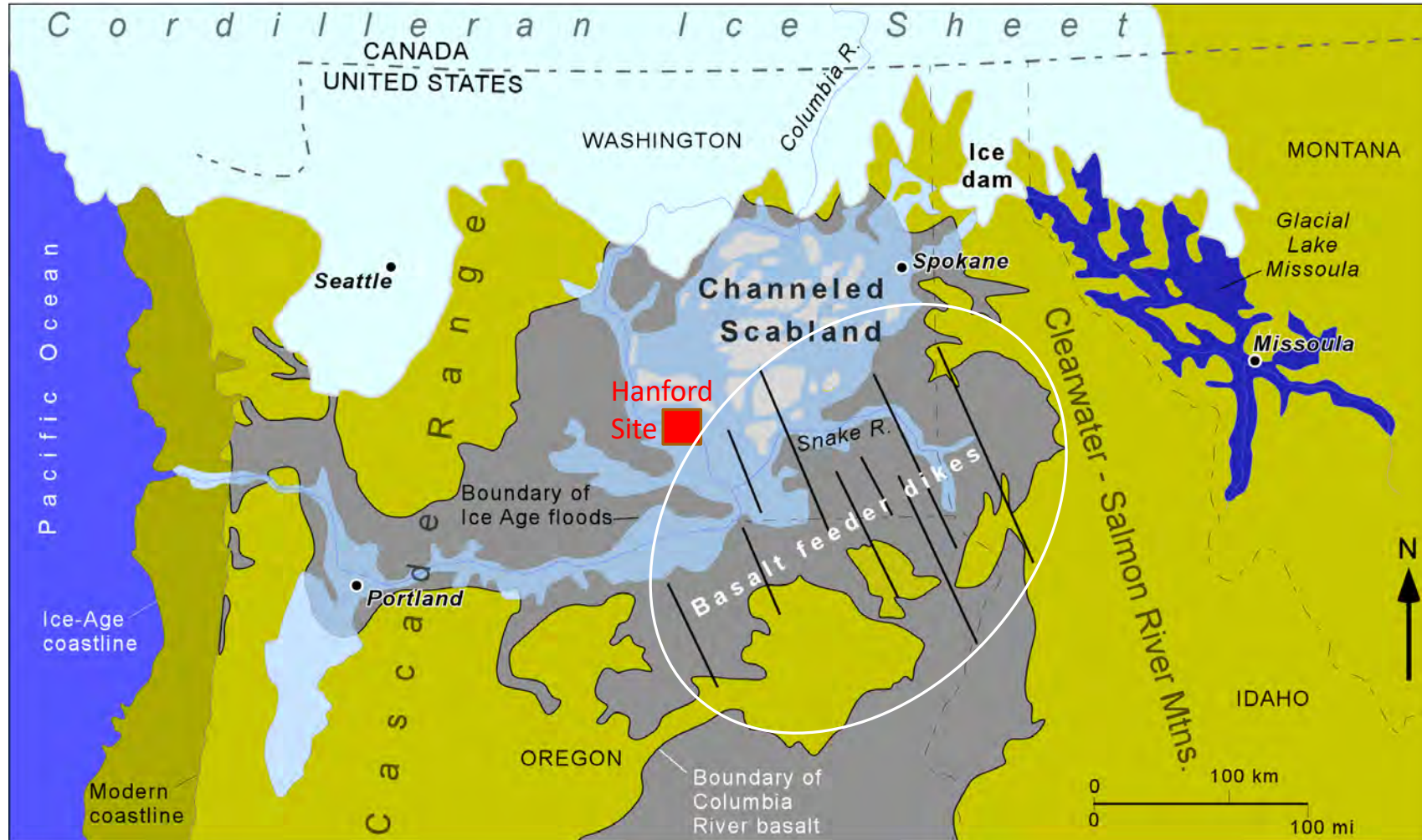


- Over 11,000 holes have been drilled since the 1940's.
- Of these only about 4000 are still being used for monitoring the subsurface beneath Hanford.

Typical Hydrogeologic Cross Section across the Hanford Site



Extent of Basalt Volcanism (gray) and Ice Age Floods (blue)

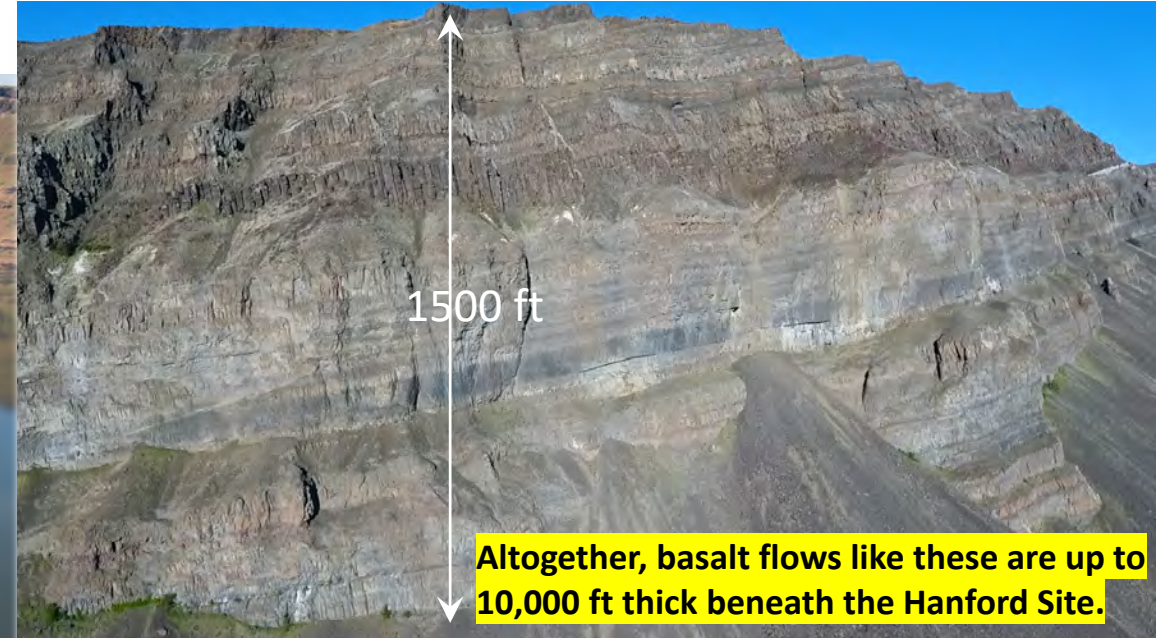


- Up to 300 separate lava flows
- Combined thickness up to 15,000 ft

Basement rock consists of volcanic lava flows of Columbia River Basalt



Wallula Gap

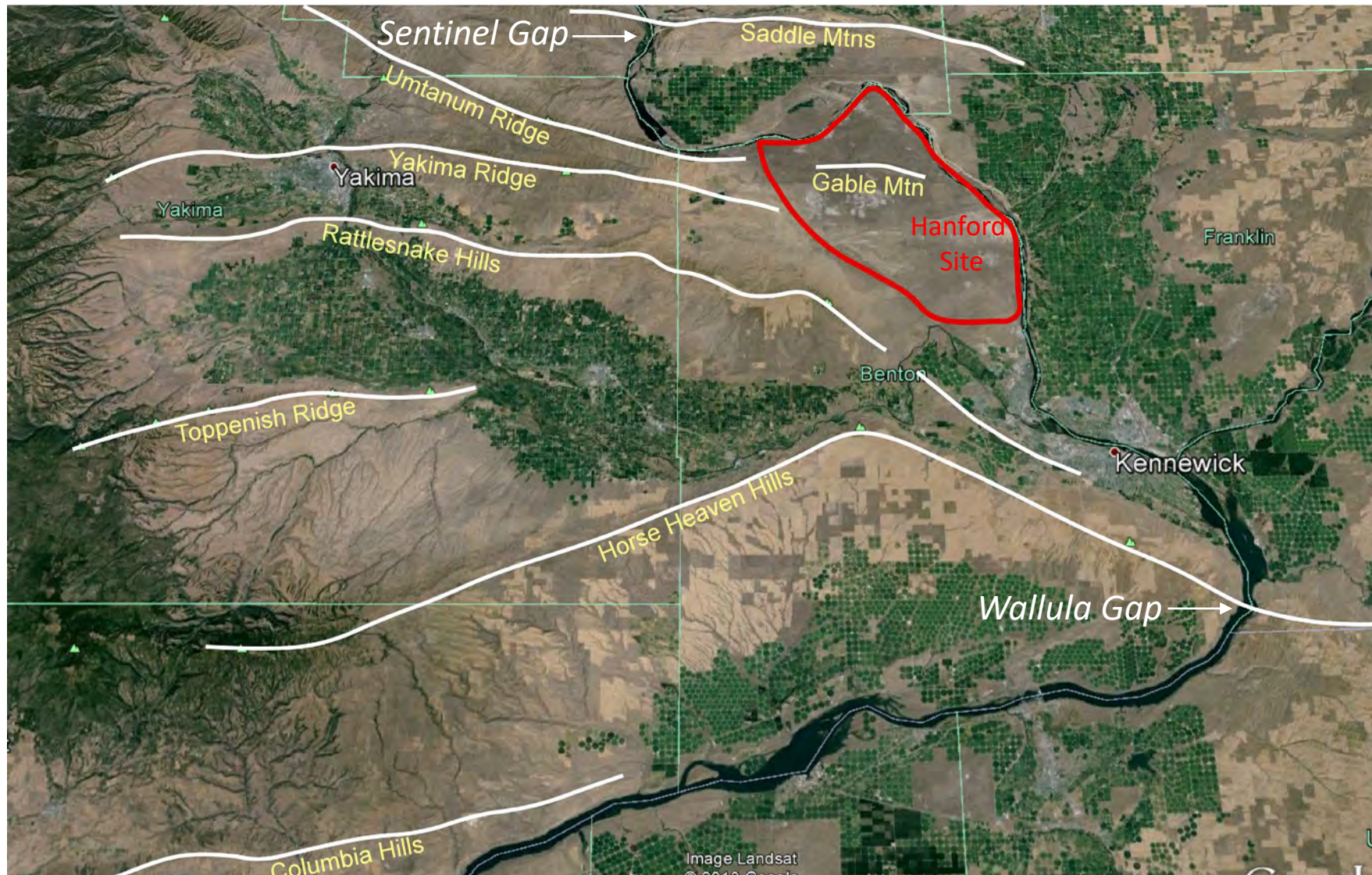


Sentinel Gap

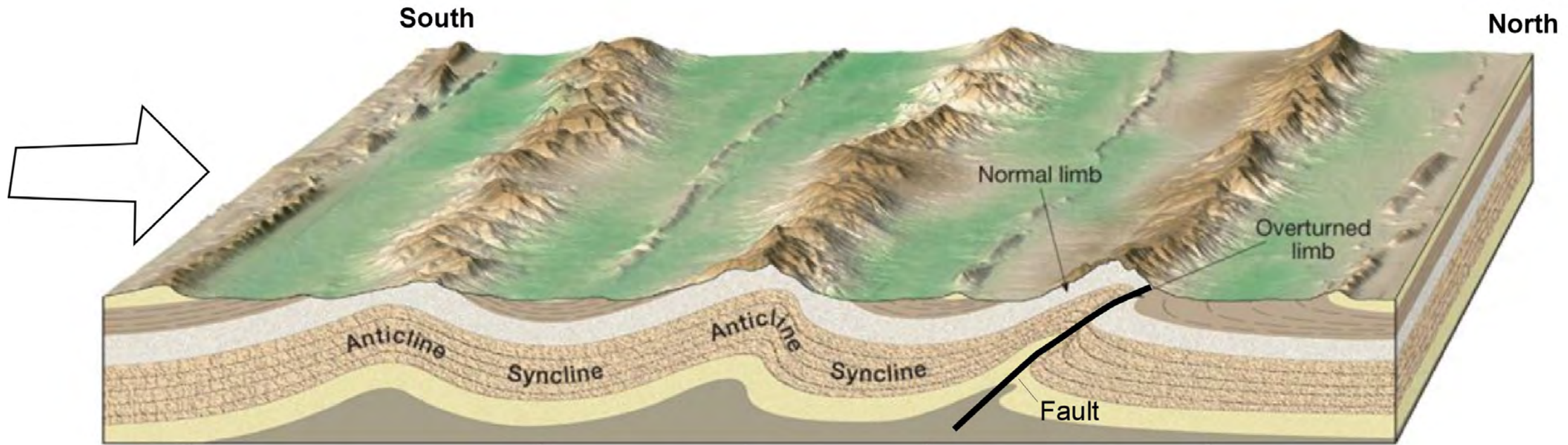


Yakima Folds

(ridges of up-folded basalt)



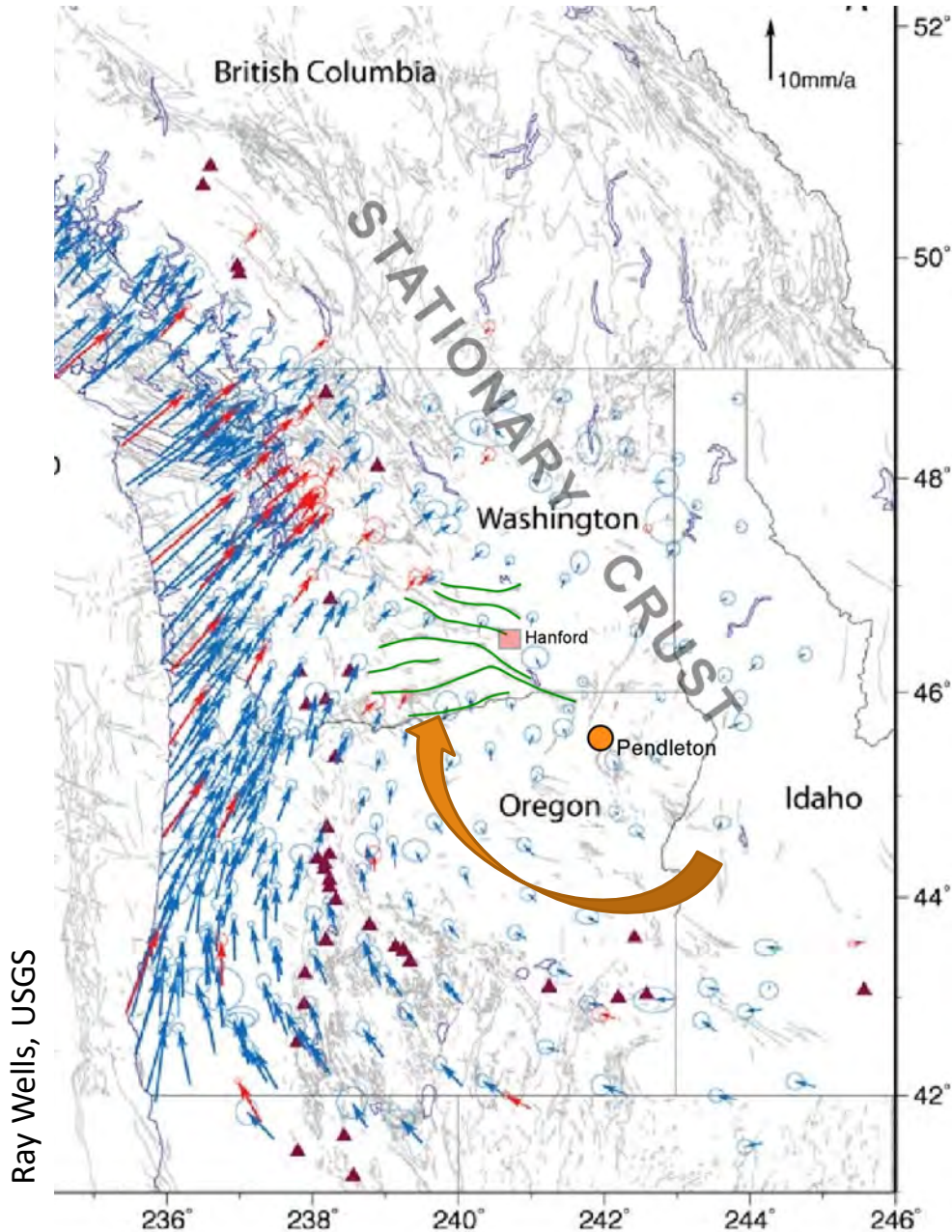
Development of Yakima Fold



Columbia River Basalt



Recently Measured Rotation of N. American Tectonic Plate



- Folding and faulting of the basalt has resulted from clockwise rotation of the North American Plate across the PNW for at least the last 40 million years.
- The rotation continues today at a rate of up to 20 mm/yr. Greatest in western OR and WA.
- Pivot point for the rotation is located near Pendleton OR.



Saddle Mountains Anticline

Ringold Formation

(3-10 million years old)

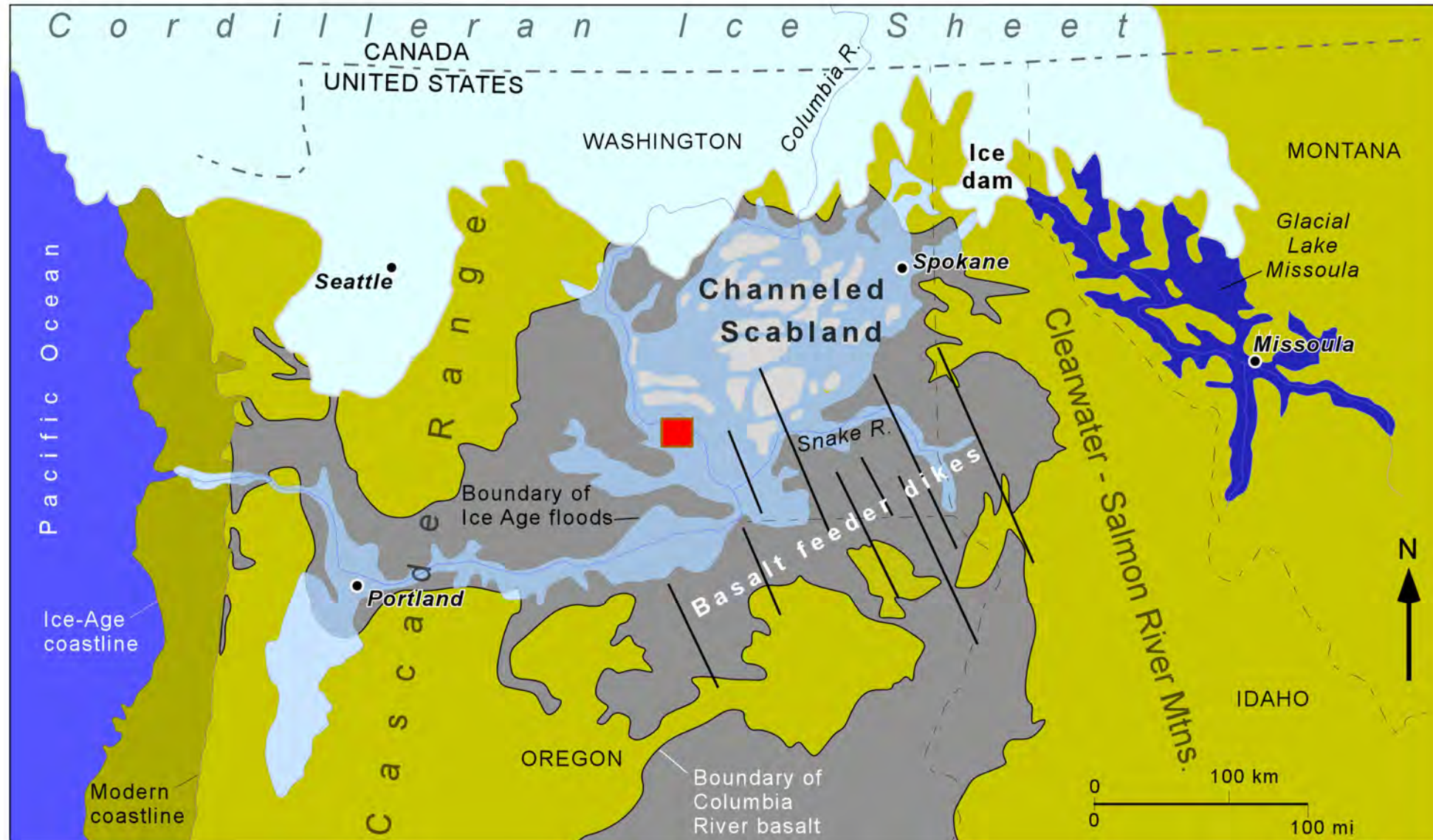
Ancient river and lake deposits
exposed along the White Bluffs



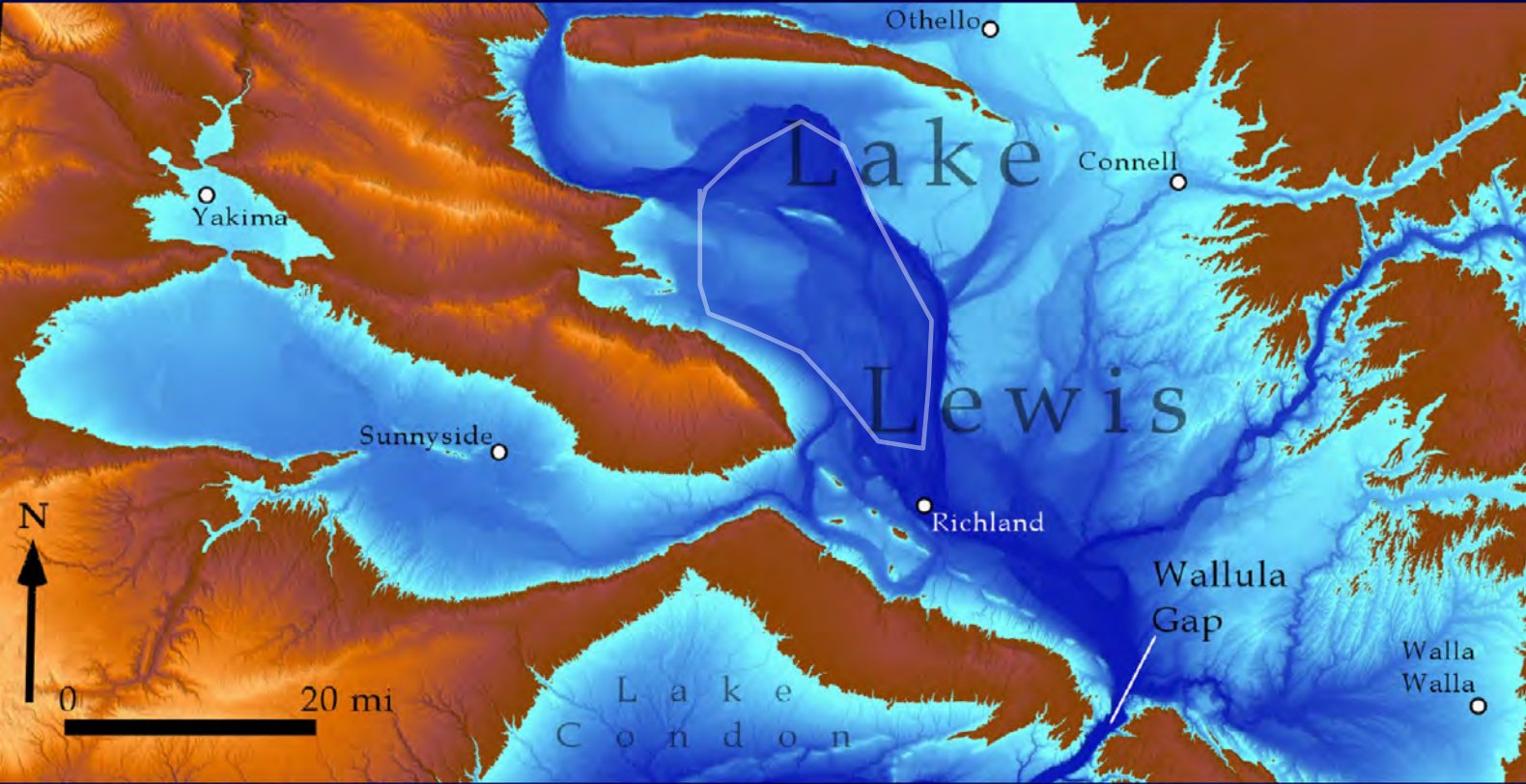
Ringold Formation



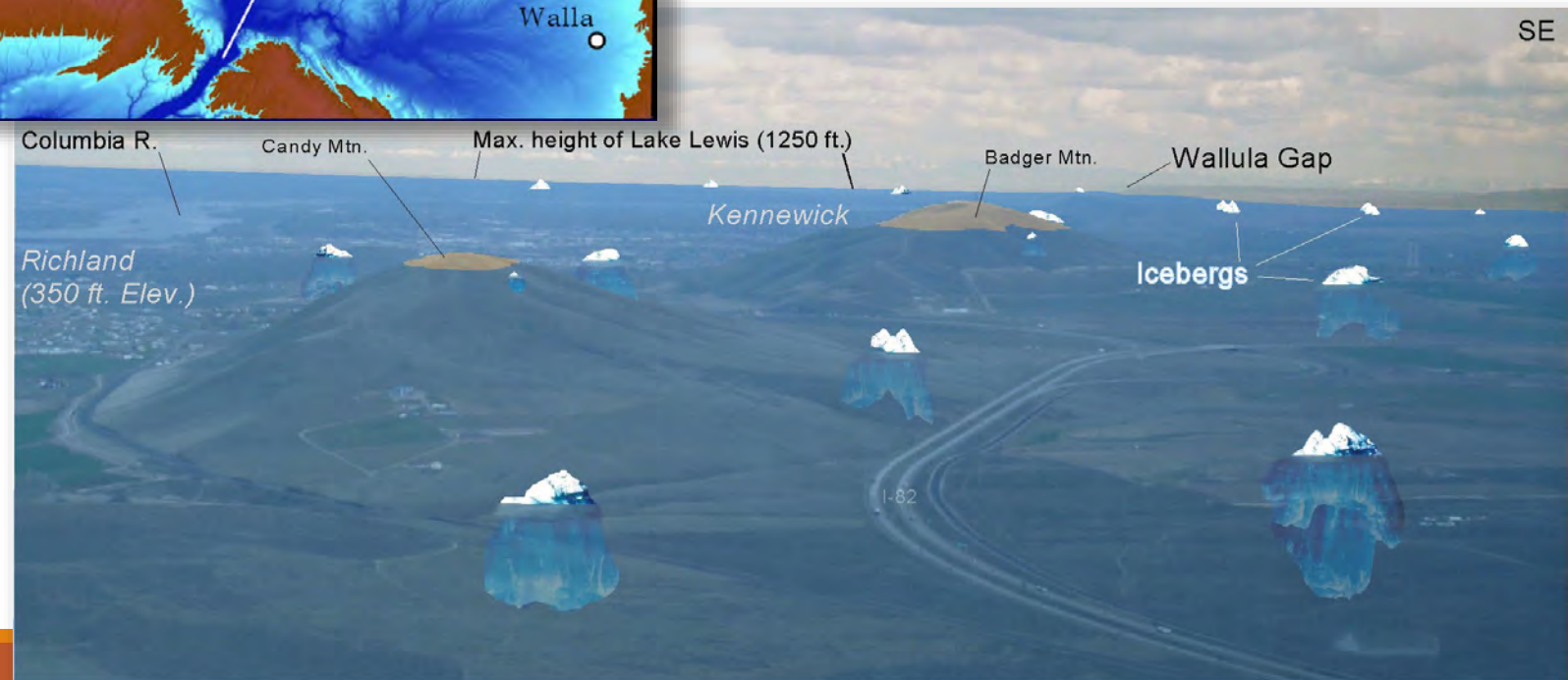
Ice-Age Megafloods from Glacial Lake Missoula



Temporary, Ice-Age Lake Lewis During a Missoula Flood



Up to 100 separate Ice Age
floods occurred during the last
glacial cycle (14-20 kyrs ago)



Icebergs Grounded Against Hillsides During flooding

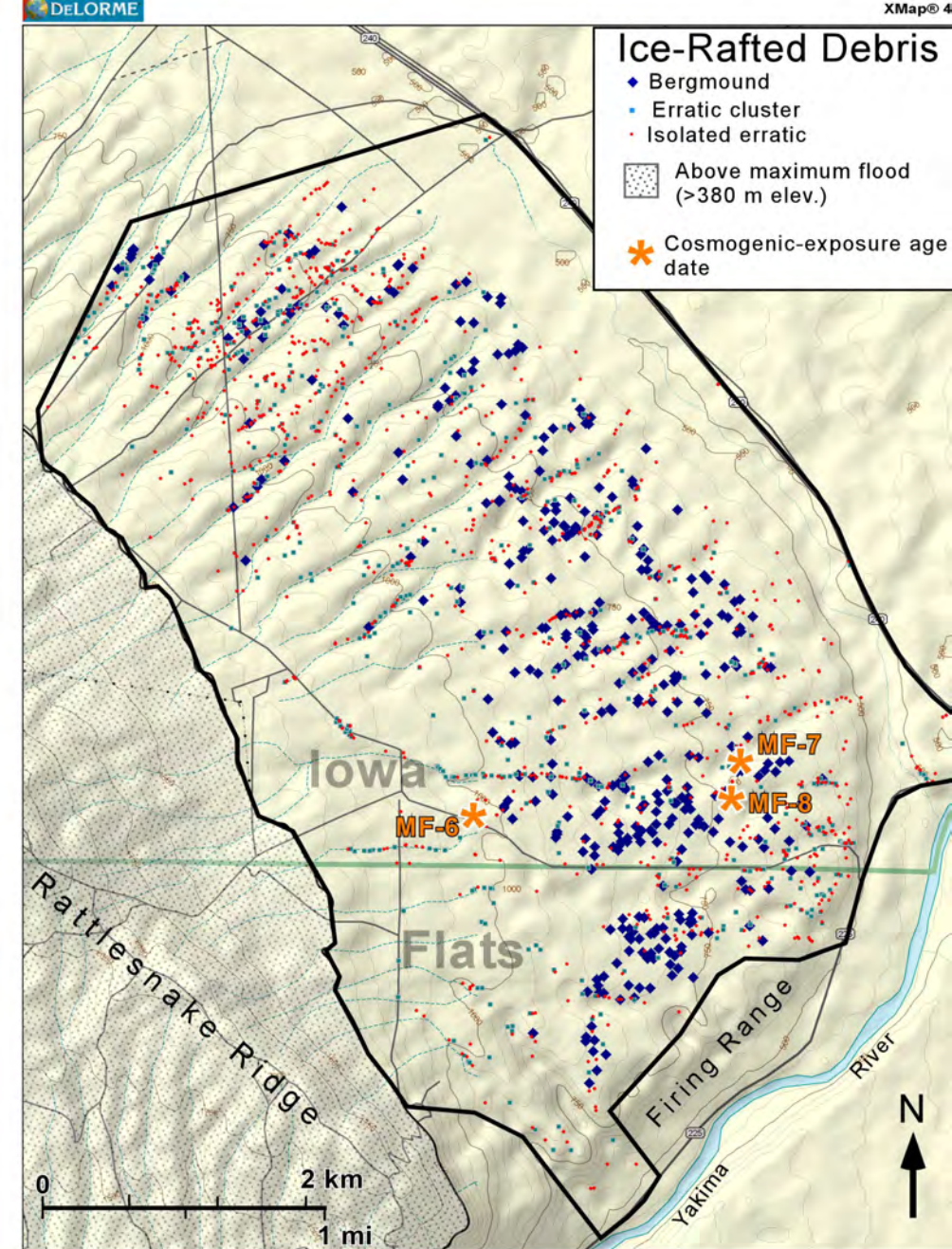
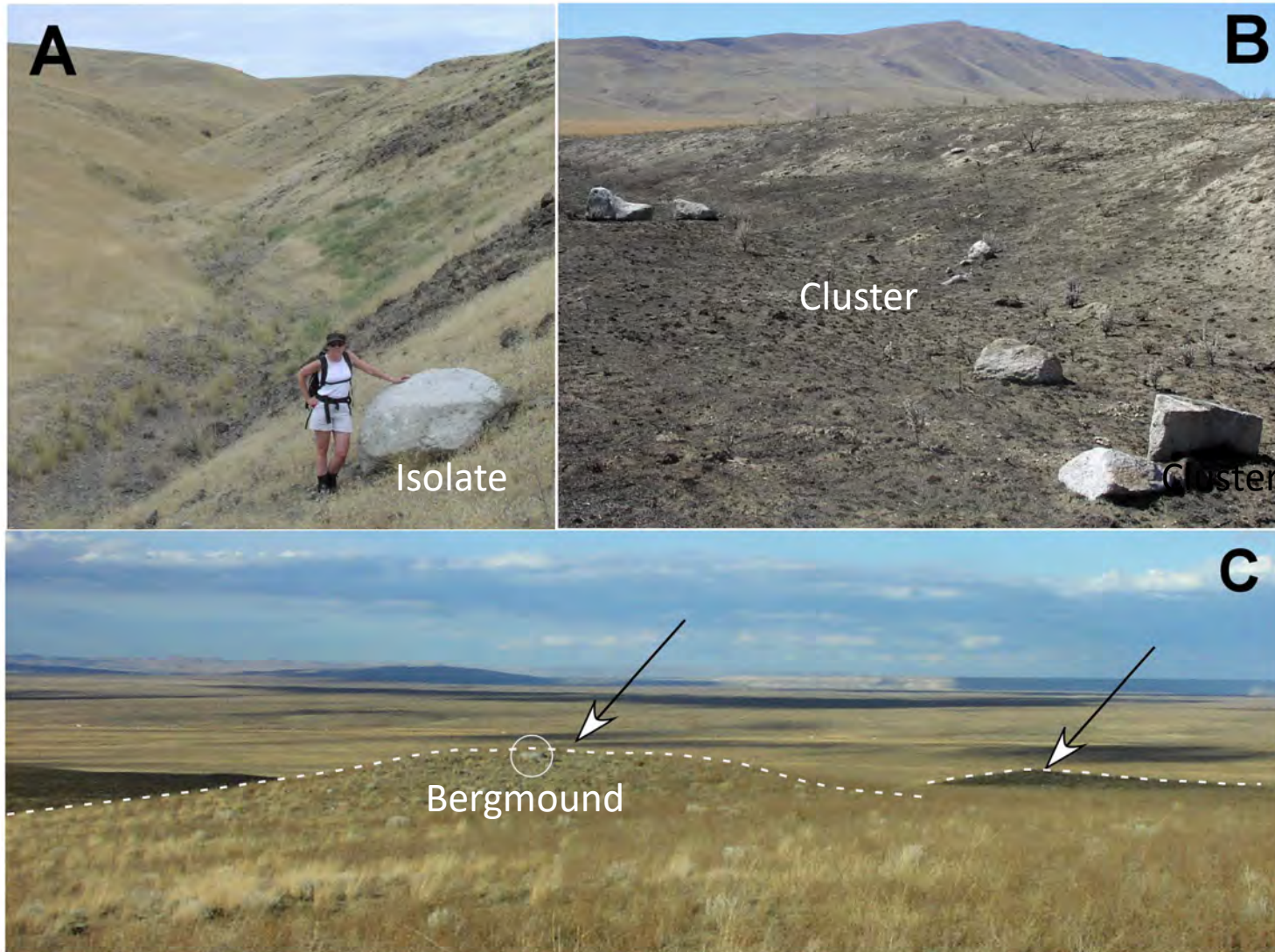


Ice-rafted boulder in Oregon's Willamette Valley (300 ft above valley floor)

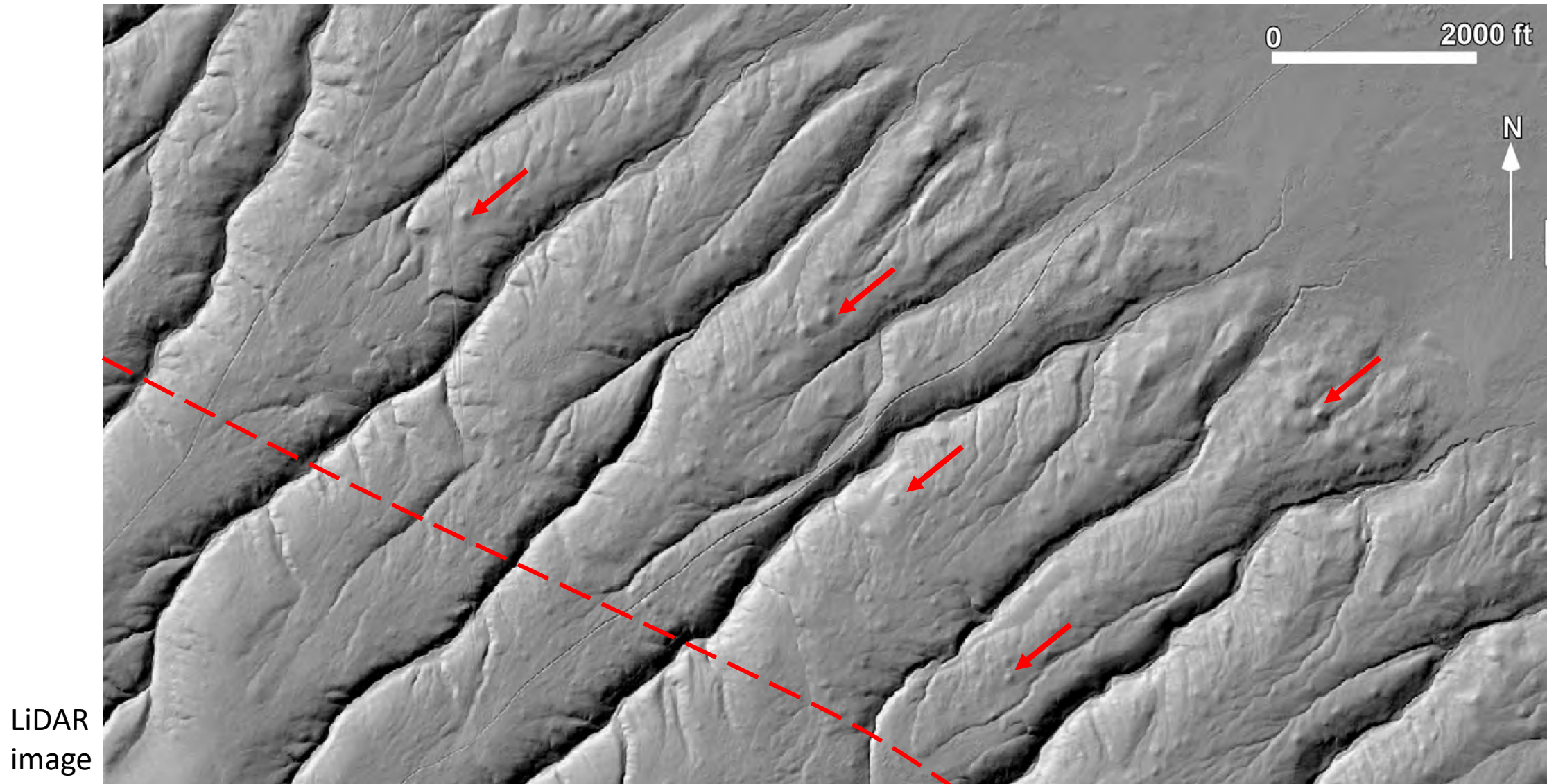


Stev Ominski

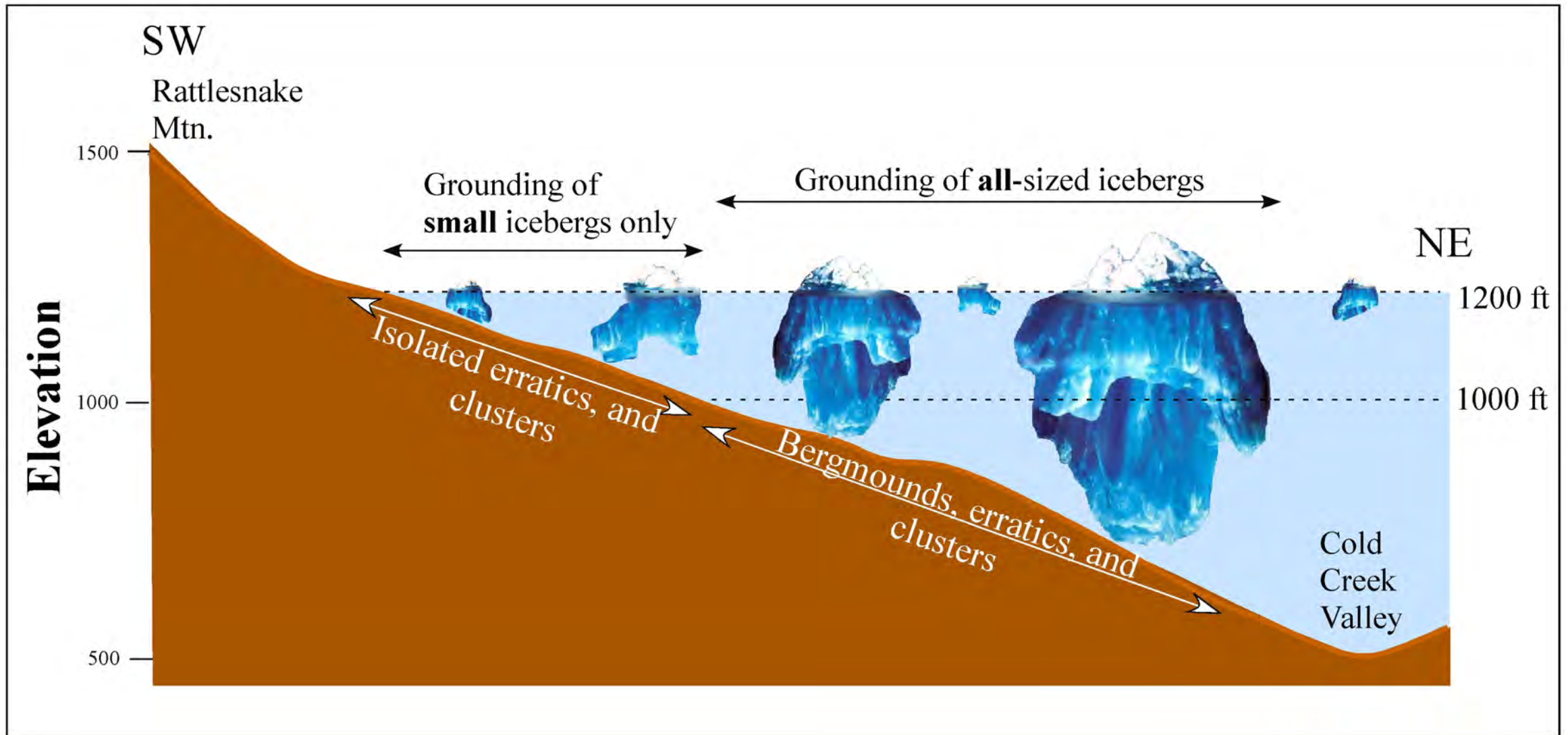
Ice-Rafted Debris from Missoula floods on Rattlesnake Mountain



Bergmounds on Rattlesnake Mountain



Bergmounds Restricted to Lower Elevations



Ice Age Flood Deposits (aka Hanford Formation)



Rhythmic beds of sand and silt



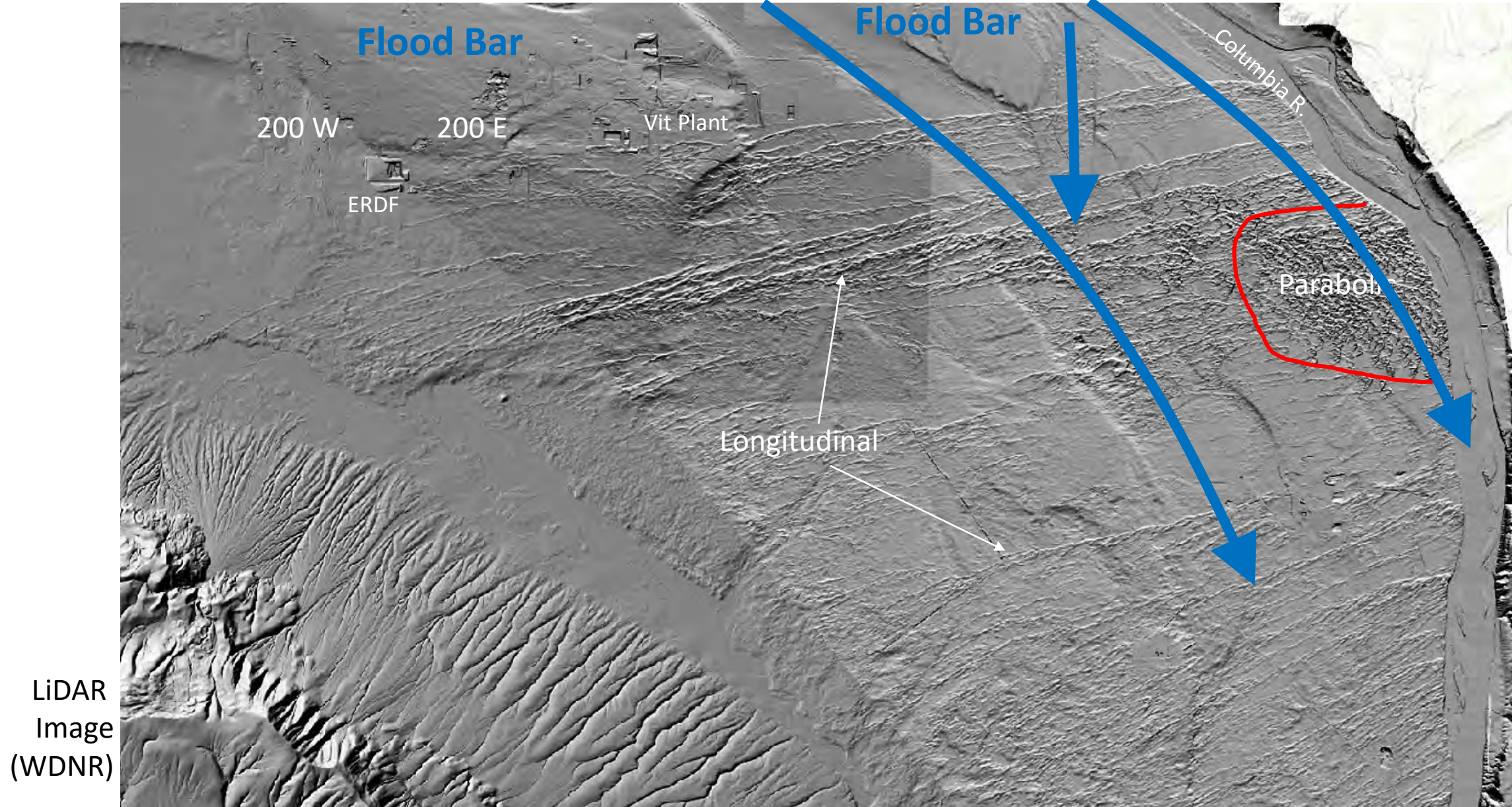
Gravel-dominated beds



Hanford Formation



Windblown Sand Dunes (Recent)



Windblown Sand Dunes



Thanks for watching...

Questions or comments?

Today's Speakers

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